Poster Proceedings of the Eighth International Conference on Data Integration in the Life Sciences (DILS 2012) 2012:22.

DILS 2012 – Posters and demos proceedings

Mapping drug entities between the European and American standards, ATC and RxNorm

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Motivation: The Anatomical Therapeutic Chemical (ATC) classification system [1] developed by the WHO Collaborating Centre for Drug Statistics Methodology (WHOCC) is widely used in Europe for the classification of drugs. In the U.S., however, the main standard vocabulary for medications is RxNorm [2] , developed by the U.S. National Library of Medicine. Interoperability between these two standards is limited, because the Unified Medical Language System© (UMLS) [3] integrates RxNorm, but not ATC. Here we assess the overlap between the two terminologies and illustrate how such a mapping will be useful in cross border interoperability initiatives and clinical decision support systems.

Materials and Methods: The ATC classification hierarchy consists of five levels, of which the first four correspond to the anatomical, therapeutic, pharmacological, and chemical groups, and the 5th comprises the actual drugs. Most of the ATC drug entities correspond to ingredients in RxNorm, e.g., Digoxin, C01AA05 in ATC and 3407 in RxNorm. We used the RxNorm API to map the labels of the ATC 5th level codes (as of 2012) to drug concepts in RxNorm, applying *exact matching followed by normalized matching* on the ATC drug labels. To improve recall, we ignored extraneous information from the original ATC drug names, in the form of parenthetical expressions and appositions. This preliminary investigation is limited to single ingredient drugs and excludes the 743 multi ingredient drugs or drug combinations in ATC.

Results: From the 3,721 single ingredient drugs, we were able to map 2,848 (77%) to RxNorm concepts. A manual review of the 920 (23%) unmapped ATC codes established that these entities are actually missing from RxNorm, not missed by our mapping strategy. This discrepancy can be explained by the different scopes of ATC and RxNorm. Unspecific, collective terms (such as *thyroid gland preparations*) and radiopharmaceuticals in ATC are out of scope for RxNorm.

Conclusions: Our findings suggest that the mapping of single ingredient drugs from ATC to RxNorm can be performed reasonably well using the lexical mapping function of the RxNorm API. This approach complements previous research on mapping ATC drug classes to NDF-RT [4], a reference drug terminology used in clinical applications. Tailored terminology mappings such as ours are required to extend EU clinical data interoperability initiatives like epSOS [5] to E.U.-U.S. interoperability. These mappings also help compare findings from different sources coded to different reference terminologies. For example, EU-ADR [6], an ATC code based system to detect adverse drug reactions (ADRs) could be compared with ADR repositories that use RxNorm, such as ADEPedia [7].

References

1.   *Guidelines for ATC classification and DDD assignment, 2012*, 2011: Oslo.